D-Link

User Manual

PowerLine AV 500 4-Port Gigabit Switch Starter Kit

DHP-541

Preface

D-Link reserves the right to revise this publication and to make changes in the content hereof without obligation to notify any person or organization of such revisions or changes.

Manual Revisions

Revision	Date	Description
1.0	June 22, 2011	• Initial release

Trademarks

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One D-Link DHP-502AV PowerLine AV 500 Network Adapter

One D-Link DHP-540 PowerLine AV 500 4-Port Gigabit Switch

Two CAT5 Ethernet Cables

CD-ROM with Software and User Manual
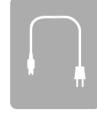
One Power Cord

Quick Install Guide

System Requirements

• Windows® 7, Windows Vista®, XP (with Service Pack 3)

• PC with 233MHz Processor, 64MB Memory

• Ethernet Adapter (1000Mbit/s)

Introduction

D-Link announces the PowerLine AV 500 4-Port Gigabit Switch Starter Kit which uses the electrical wiring that's already in your house to provide fast, reliable speeds of up to 500Mbps* to any room in the house. Simply connect the PowerLine AV 500 adapter into an existing power outlet, connect it to your home network router, and plug the PowerLine AV 500 switch into any other room in your house to get instant shared network connections. With 4 gigabit ports, you can connect more devices per room and get blazing speeds in each room without tripping over tangled, messy wires. It's cable management at its best.

Features

- Connect up to 4 Ethernet-enabled devices (DHP-540 switch)

- Provides Ethernet to PowerLine Connection

- Fast Data Transfer Rate of up to 500Mbps*

- Four 10/100/1000 Ethernet Ports (DHP-540)

- One 10/100/1000 Ethernet Port (DHP-502AV)

- Plug & Play, Easy Installation

- Supports 128-bit AES Encryption for Network Security

- Backward Compatible with HomePlug AV Devices

- Push and Secure Encryption Button

- Power Saving mode

* Maximum throughput based on theoretical transmission PHY rate. Actual data throughput will vary. Network conditions and environmental factors, including volume of traffic and network overhead, may lower actual data throughput rate. Interference from devices that emit electrical noise, such as vacuum cleaners and hair dryers, may adversely affect the performance of this product. This product may interfere with devices such as lighting systems that have a dimmer switch, short wave radios, or other PowerLine devices that do not follow the HomePlug AV standard.

DHP-502AV Hardware Overview
LEDs

1	**Power LED**	• Solid - Indicates that the device is receiving electrical power. • Blinking - Indicates that the device is setting itself up after reset or when the security button was pressed or power saving mode enabled. • Off - The device is not receiving electrical power.
2	**PowerLine LED**	• Solid - The device is connected to a PowerLine network. • Blinking - The device is transmitting data. • Off - The device has not found any other compatible PowerLine devices using the same encryption key. ***The color indicates the PowerLine link rate:*** • Green - The PowerLine link rate is faster than 80 Mbps. • Amber - The PowerLine link rate is between 50 Mbps and 80 Mbps. • Red - The PowerLine link rate is less than 50 Mbps.
3	**Ethernet LED**	• Solid - The Ethernet port is linked but there is no data traffic. • Blinking - The device is transmitting data. • Off - There is no Ethernet connection.
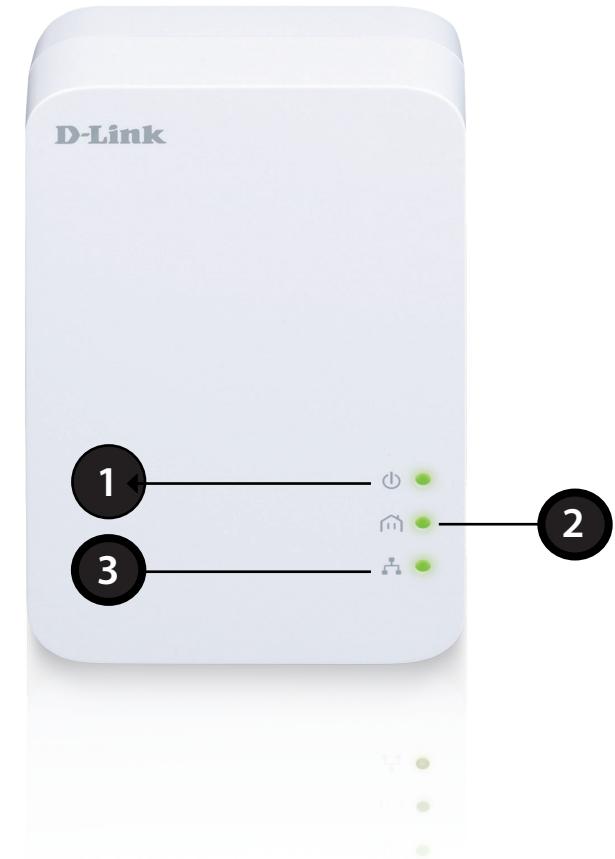
DHP-502AV Hardware Overview
Connection

| 1	**Ethernet Port**	Connect the CAT5 Ethernet cable to the DHP-502AV Ethernet port.
2	**Reset Button**	Press and hold the button for one second to reset to factory default.
3	**Simple Connect Button**	Press to secure your network. Refer to page 10 for more information.

DHP-540 Hardware Overview
LEDs

1	**Power LED**	• Solid - Indicates that the device is receiving electrical power. • Blinking - Indicates that the device is setting itself up after reset or security button was pressed or power saving mode enabled. • Off - The device is not receiving electrical power.
2	**PowerLine LED**	• Solid - The device is connected to a PowerLine network. • Blinking - The device is transmitting data. • Off - The device has not found any other compatible PowerLine devices using the same encryption key. *The color indicates the PowerLine link rate:* • Green - The PowerLine link rate is faster than 80 Mbps. • Amber - The PowerLine link rate is between 50 Mbps and 80 Mbps. • Red - The PowerLine link rate is less than 50 Mbps.
3	**LAN LEDs (1-4)**	• Solid - The Ethernet port is linked but there is no data traffic. • Blinking - The device is transmitting data. • Off - There is no Ethernet connection.
4	**Simple Connect Button**	Press to secure your network. Refer to page 11 for more information.

DHP-540 Hardware Overview
Connection
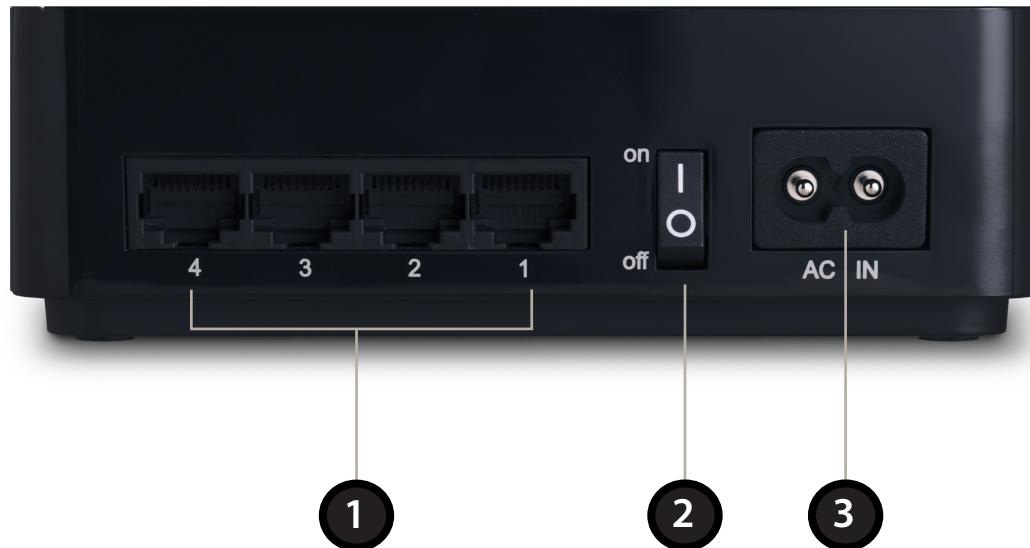
1	Ethernet Ports (1-4)	Connect the CAT5 Ethernet cable to the selected Ethernet port in accordance to priority.
2	On/Off Button	Press to turn the power on or off.
3	Power Receptor	Receptor for the supplied power cord.

Hardware Installation

Recommendations
- For best results, use in a regular wall outlet without any other product plugged into the same outlet. Connecting this product to a power strip or a surge protector may adversely affect the performance of this product.
- Avoid using the PowerLine AV 500 switch/adapters in an electrical outlet that is located near an appliance that uses a lot of power such as a washer, dryer, refrigerator, microwave, hair dryer, or air conditioning system.
- To verify connectivity or if you are having connection problems, plug the adapters in the same room to verify whether your home's electrical wiring is contributing to the issue. The adapters' PowerLine LED indicators will illuminate if the connection is established.

Step 1
Plug the DHP-502AV adapter into an AC Wall outlet. Connect the included Ethernet cable to the network cable connector located on the PowerLine AV 500 Network Adapter and attach the other end of the Ethernet cable to an Ethernet device (e.g. router). Power source is confirmed when the Power LED is illuminated.

Step 2
Connect the supplied power cord into the power receptor located on the back of the DHP-540 switch and press the power button to the ON position. Power source is confirmed when the Power LED is illuminated.

Step 3
Connect an Ethernet cable to one of the 4 ports located on the DHP-540 switch and attach the other end of the Ethernet cable to an Ethernet device such as a computer, NAS device, game console, media player, and Internet TV.

Note: Network Connectivity is confirmed when the PowerLine and Ethernet LED indicators on the adapter and switch are illuminated.

Network Diagram

Game Console

TV

NAS Storage

Blu-ray DVD Player

Wireless Router

Cable/ DSL Modem

DHP-502AV (included)

DHP-540 (included)
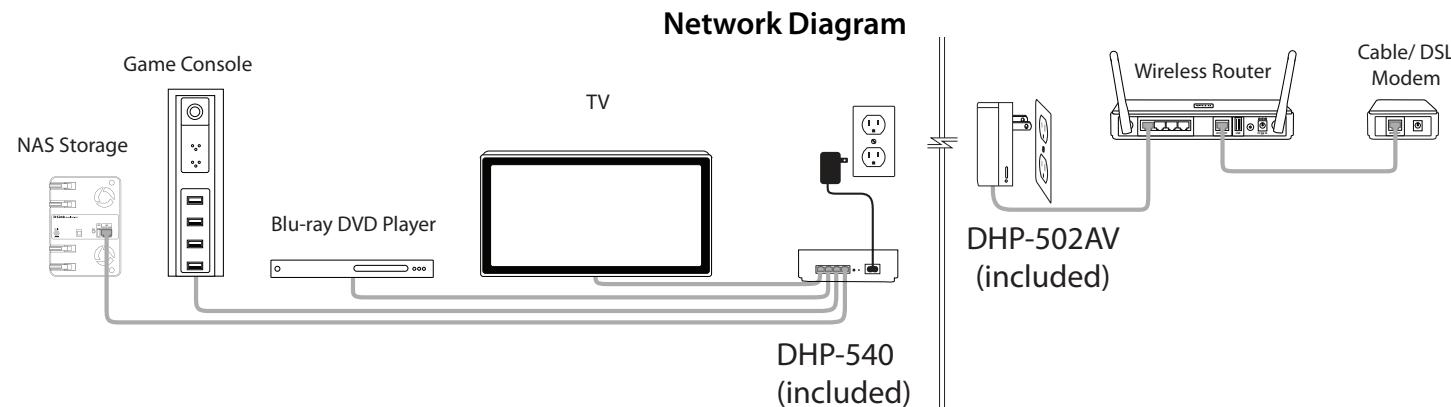
Push Button Security

Understanding PowerLine AV 500 Network Security
The PowerLine AV 500 4-Port Gigabit Switch Starter Kit must use an identical encryption key for the network. The default encryption key for each PowerLine AV 500 device is *HomePlugAV*. All PowerLine AV 500 4-Port Gigabit Switch Starter Kits with a default encryption key can communicate with each other.

It is recommended to create a private encryption key for network security purpose. The private encryption key allows you to protect your network from unauthorized access via the PowerLine network. To create a private encryption key instead of the default encryption key, please follow below steps:

Step 1 - PowerLine AV 500 4-Port Gigabit Switch (DHP-540)
Press the Simple Connect button located on the top of the switch for no more than two seconds. The Power LED will start blinking after you release the button. The switch will create a private, randomly generated encryption key that the PowerLine AV 500 devices in your network will use.

Step 2 - PowerLine AV 500 Network Adapter (DHP-502AV)
Within two minutes of pushing the Simple Connect button of the switch, press the Security Button on the adapter for no more than two seconds. The Power LED will start blinking after you release the button.

Note: Both Security buttons must be pressed within two minutes.

Step 3 - PowerLine Network
After the above network security setup steps, your PowerLine network will be securely configured with the same network encryption key. The PowerLine AV 500 switch and adapter will memorize the security settings even if they are unplugged.

Note: To change the private encryption key, please reset the adapter back to its default value by pressing the Reset button for two seconds and then follow the security setup procedure above.

DHP-540

DHP-502AV

Using the Setup Wizard

Follow the simple steps below to run the Setup Wizard to guide you quickly through the installation process. Insert the D-Link DHP-541 CD into your CD-ROM drive. If the CD Autorun function does not automatically start on your computer, click **Start** > **Run**. In the Run command box type "D:**autorun**.exe", where D: represents the drive letter of your CD-ROM. If it does start, proceed to the next screen.

Click on **Install** to begin.

Configuration

After you have completed the D-Link PowerLine AV Utility installation wizard, double-click the D-Link PowerLine AV Utility icon on your desktop to start the configuration of the DHP-541.

Double-click the D-Link PowerLine AV Utility icon

The D-Link PowerLine AV Utility allows you the option to configure your PowerLine network settings and will display PowerLine device information.
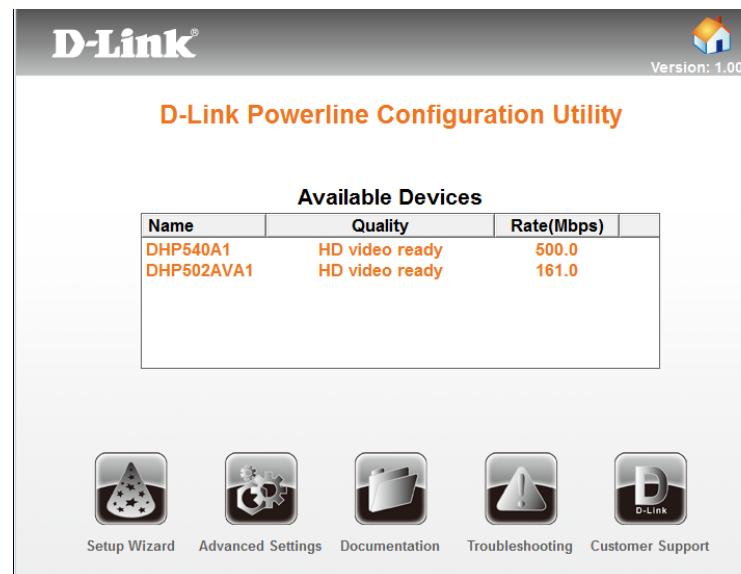
The setup wizard is designed to assist the installation of your PowerLine network. Click the Setup Wizard icon on the left corner of utility to start the installation process.
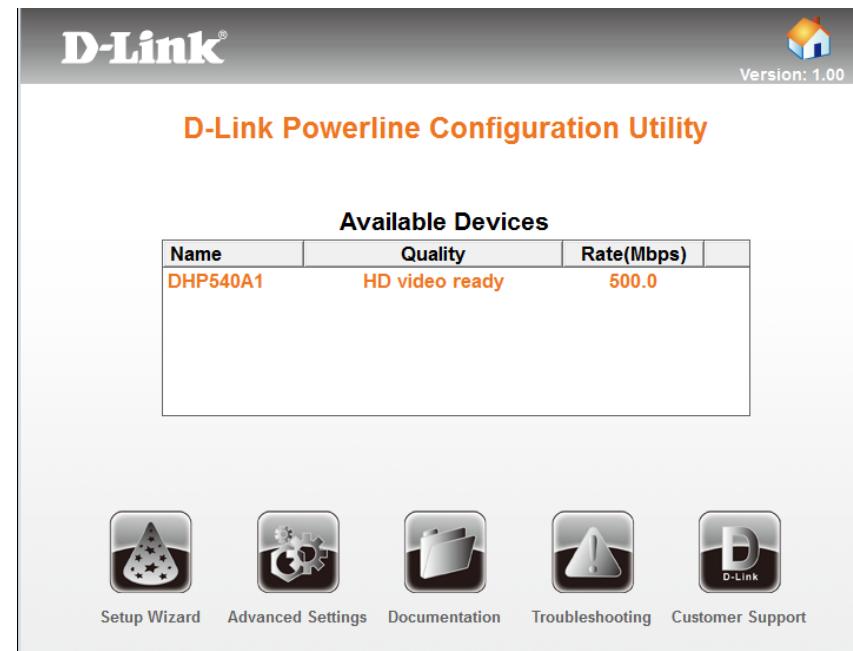
Click the **Setup Wizard** icon**.**

Plug the DHP-540 power cord into an electric outlet. Plug the other end of the power cord to the back of the device and then turn on the device by pushing the power switch to the ON position located on the back of the device. Power source is confirmed when the Power LED is illuminated.

Click **Next** to continue.

1. Connect the Ethernet cable from the LAN port to your computer's Ethernet Port.

2. Please ensure that the LED in front of the device is on.

Click **Next** to continue.

Plug in the DHP-502AV adapter into an outlet. Power source is confirmed when the Power LED is illuminated.

To encrypt your network, press the Simple Connect Button on top of the DHP-540 switch for 2 seconds. The power LED will begin flashing. Within 2 minutes, press the Simple Connect Button on the DHP-502AV adapter.
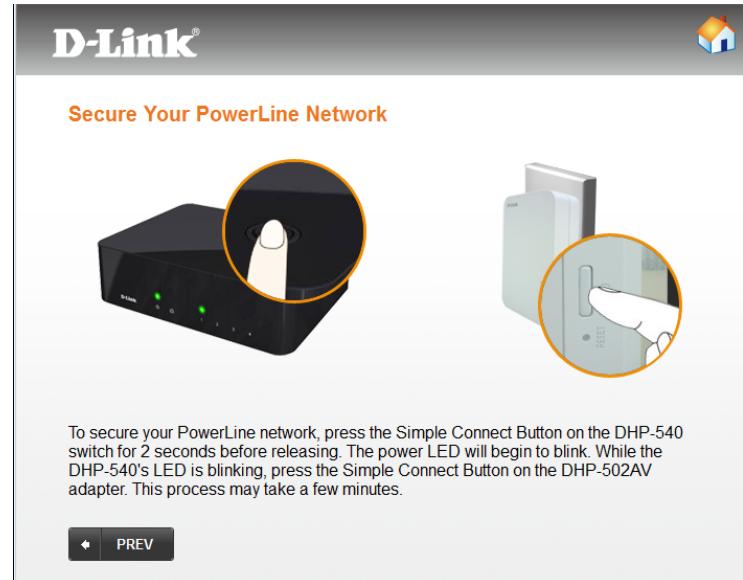
Please wait while the your PowerLine network is being secured.

Your PowerLine network is now secured, click **Next** to continue.
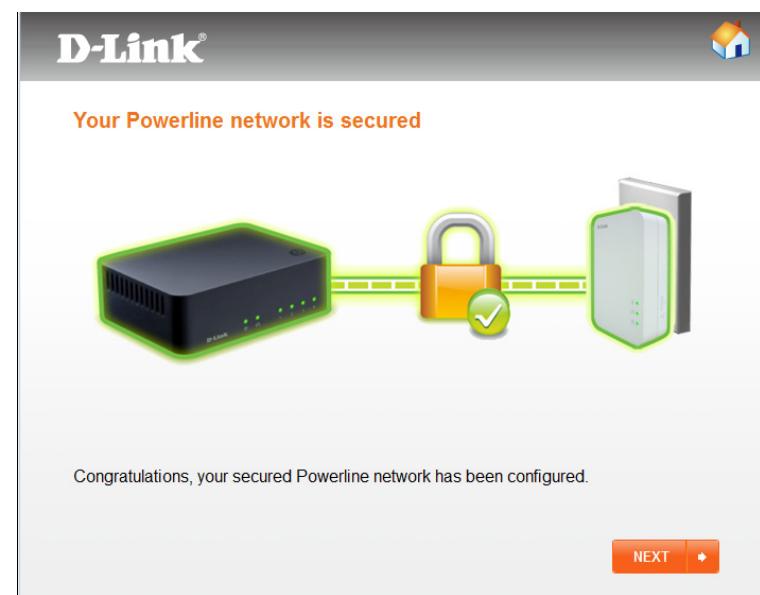
Click **Finish** to complete the installation.
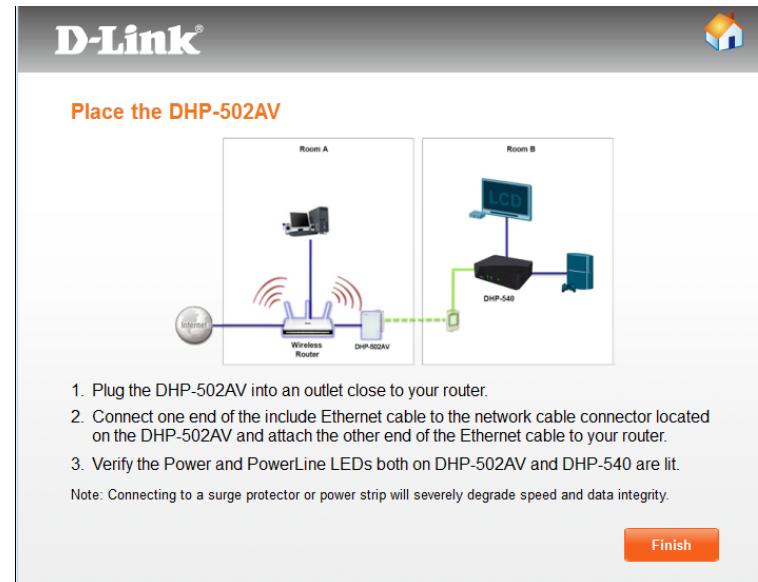
Advanced Settings

The Advanced Settings section will allow you to reset your device back to default settings, upgrade firmware, secure your network, and display device and network information.
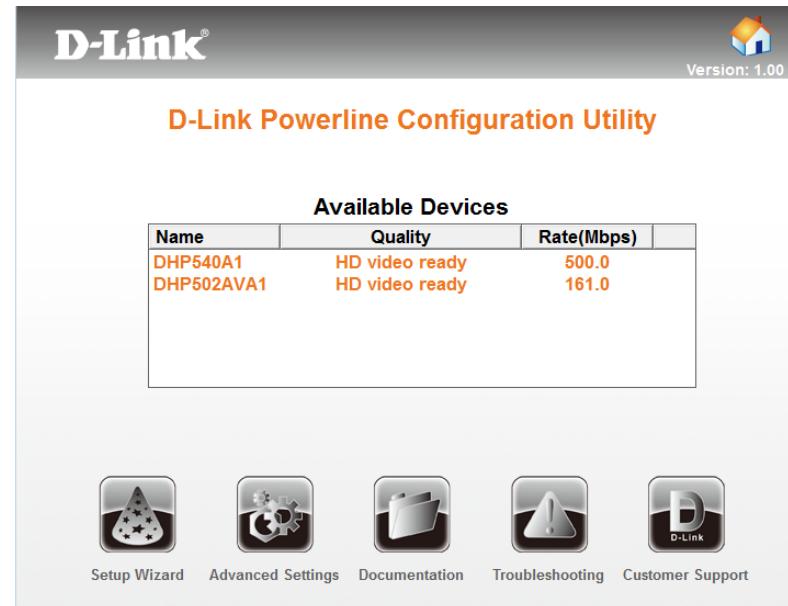
Click the **Advanced Settings** icon.
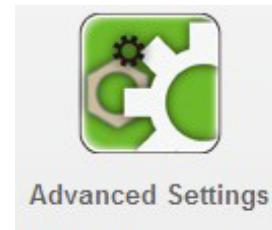
Device Info

Under Device, information such as the device name, MAC address, and the firmware version are displayed. Firmware updates are released periodically to improve the functionality of your PowerLine device. If you run into a problem with a specific feature of the PowerLine device, check if there is an updated firmware available here.

Device Name: Displays the name of the devices that have been discovered. The device's name is initially set by the utility itself.

MAC address: Displays the MAC address of the connected PowerLine device.

Firmware Version: Displays the firmware version of the connected PowerLine device. See below for more.

Reset Device: Reset the device back to the factory default settings.
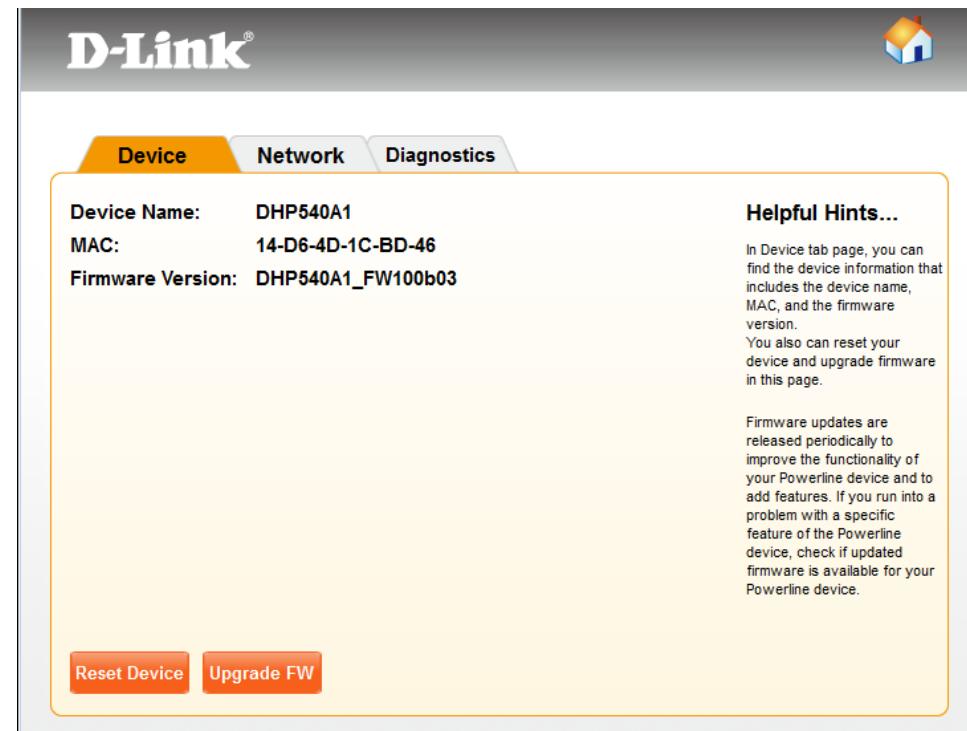
Upgrade Firmware: If you clicked Upgrade Firmware, the following window will appear. After you have downloaded the new firmware, click **Browse** to locate the firmware update on your hard drive. Click **OK** to complete the firmware upgrade

Network Info

Name: Displays the name of the devices that have been discovered. The device's name is initially set by the utility itself.

Location: Displays if the device is local or remote.

Mode: Displays the PowerLine Mode.

Rate: Displays the link rate of the connected to the PowerLine device.

Device Password: Displays the password of the devices that have been discovered. The device's password is initially set by the utility itself.

Edit: Click to edit the settings to the highlighted device.

Scan: Click to scan your network for PowerLine devices.

Encryption Key: Enter an encryption key to apply to your PowerLine devices.

Use Default: Click to use the default encryption key.

Apply: Click **Apply** to save your settings.
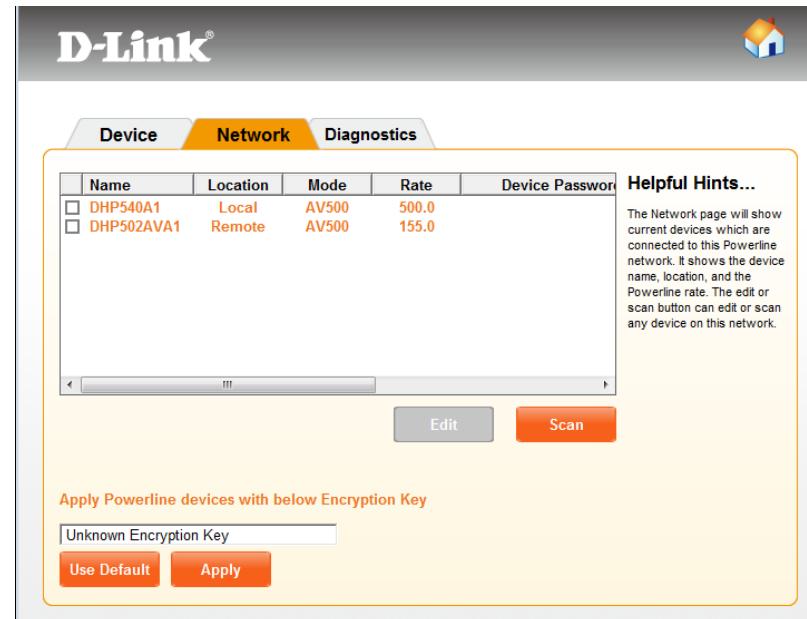
Diagnostics

This screen displays the current configuration information for your device and system.

Security

Understanding the Encryption Key setting:

The PowerLine devices on the same network must use an identical encryption key. The default encryption key for each PowerLine device is HomePlug AV. All devices with a default encryption key can communicate with each other. It is recommended to create a private encryption key to protect your network from unauthorized access via the PowerLine network.

Setting your private Encryption Key

1. Enter the device's password before changing the encryption key:
   - Local Device: You do not need to enter the device's password before changing the encryption key.
   - Remote Device: You must enter the device's password before changing the encryption key.

Note: *Each device has a unique device password on the device label.*
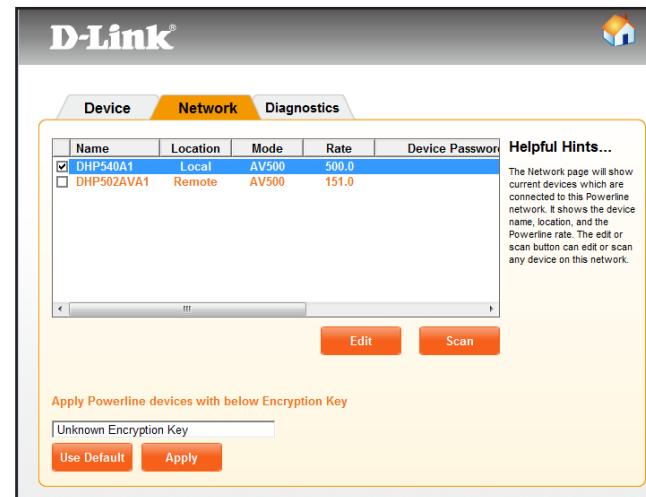
2. Select the remote device and then enter the device's password into the Set Device Password window. Then click **OK.**

3. Select the PowerLine devices that you would like to apply the encryption key setting. Then, type your private encryption key into the Encryption Key Setting field and click **Set Selected Devices**. The utility will show a message once the setting has been completed.
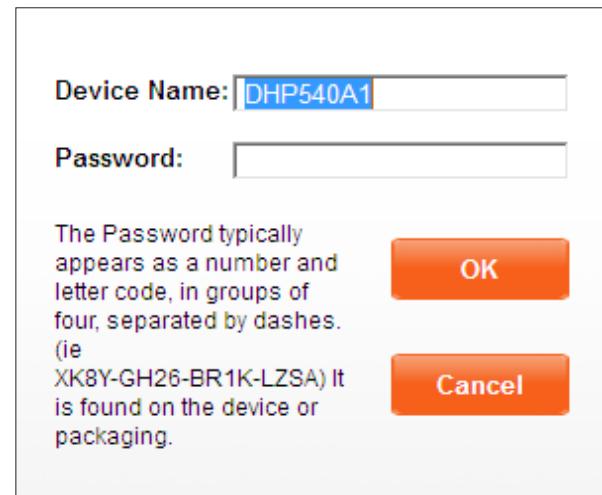
Adding a Device to your PowerLine Network

If you use the default encryption key within the existing PowerLine Network and the new device retains the default encryption key, you can just plug the new device into a power outlet. Then all the devices will be able to communicate with each other.

If the encryption key within the existing PowerLine network has been customized, you have two ways to add the new device to your PowerLine Network.

1. You can use the PowerLine AV Utility to apply the customized encryption key in your record to the new device. Then all devices can communicate with each other by using the customized encryption key.

2. You can use PowerLine AV Utility to set all devices within the existing PowerLine Network and the new device back to the first default encryption key. Then follow the 1 to 3 steps of "Setting your private Encryption Key". Your PowerLine network will be securely configured with a customized encryption key and all devices will be able to communicate with each other after your setting.

Documentation

This screen allows you to view the user manual and quick install guide. In order to properly view the documents, you will need to use Adobe Reader.

Click the Documentation icon.
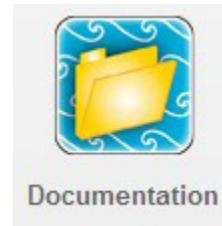
Troubleshooting

- **PowerLine AV configuration utility does not start correctly:**

  Reinstall the utility.

- **PowerLine AV configuration utility does not detect the DHP-540 switch and DHP-502AV adapter :**

  Please make sure your DHP-540 switch and your DHP-502AV adapter are correctly plugged and connected to the computer or network device.

- **I can't configure any parameters on the DHP-540 switch and the DHP-502AV adapter. An error is shown when I try to configure it:**

  Please make sure you have not unplugged the DHP-540 switch and the DHP-502AV adapter while configuring it.

- **I changed the connection cable to another Network adapter and now the utility does not work correctly:**

  Please restart the utility each time you disconnect the connection cable.

- **I'm having a lot of problems configuring my network:**

  If you are having problems configuring the network with two or more PowerLine AV 500 adapters, please make a reset to all of the adapters and start configuring the adapters again. To test whether the electrical wiring is contributing to the problem, plug the PowerLine adapters in the same room.

DHP-540 Technical Specifications

Network Ports
• Four 10/100/1000 Ethernet ports

EMC
• FCC Part 15 Class B
• CE EMC Class B

AC Input
• 100 ~ 240VAC, 50/60Hz

Safety
• UL, CE LVD

Standards
• IEEE 802.3
• IEEE 802.3u
• Compatible with IEEE 1901
• HomePlug AV

Power Consumption Compliance
• EuP (Energy Using Product Directive)
• CoC (Code of Conduct on Energy Consumption of Broadband Equipment)

Data Rate
• Up to 500Mbps (PHY rate)

QoS
• Integrated QoS prioritizes media and data

Encryption
• 128 bit AES Data Encryption

Operation Temperature
• 0°C ~ 40°C

Storage Temperature
• -10°C ~ 70°C

Humidity
• Operation: 10% ~ 90% RH
• Storage: 5% ~ 95% RH

Powerline Modulation Scheme
• OFDM Symbol Modulation

Powerline Frequency Band
• 2MHz to 70MHz

DHP-502AV Technical Specifications

Network Ports
• One 10/100/1000 Ethernet port

EMC
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Powerline Modulation Scheme
• OFDM Symbol Modulation

Powerline Frequency Band
• 2MHz to 70MHz

Contacting Technical Support

U.S. and Canadian customers can contact D-Link technical support through our web site or by phone.

Before you contact technical support, please have the following ready:

- Model number of the product (e.g. DHP-541)
- Hardware Revision (located on the label on the bottom of the product (e.g. rev A1))
- Serial Number (s/n number located on the label on the bottom of the product).

You can find software updates and user documentation on the D-Link website as well as frequently asked questions and answers to technical issues.

For customers within the United States:

Internet Support:

http://support.dlink.com

For customers within Canada:

Internet Support:

http://support.dlink.ca

Warranty

Subject to the terms and conditions set forth herein, D-Link Systems, Inc. ("D-Link") provides this Limited Warranty:

- Only to the person or entity that originally purchased the product from D-Link or its authorized reseller or distributor, and
- Only for products purchased and delivered within the fifty states of the United States, the District of Columbia, U.S. Possessions or Protectorates, U.S. Military Installations, or addresses with an APO or FPO.

Limited Warranty:
D-Link warrants that the hardware portion of the D-Link product described below ("Hardware") will be free from material defects in workmanship and materials under normal use from the date of original retail purchase of the product, for the period set forth below ("Warranty Period"), except as otherwise stated herein.

- Hardware (excluding power supplies and fans): One (1) year
- Power supplies and fans: One (1) year
- Spare parts and spare kits: Ninety (90) days

The customer's sole and exclusive remedy and the entire liability of D-Link and its suppliers under this Limited Warranty will be, at D-Link's option, to repair or replace the defective Hardware during the Warranty Period at no charge to the original owner or to refund the actual purchase price paid. Any repair or replacement will be rendered by D-Link at an Authorized D-Link Service Office. The replacement hardware need not be new or have an identical make, model or part. D-Link may, at its option, replace the defective Hardware or any part thereof with any reconditioned product that D-Link reasonably determines is substantially equivalent (or superior) in all material respects to the defective Hardware. Repaired or replacement hardware will be warranted for the remainder of the original Warranty Period or ninety (90) days, whichever is longer, and is subject to the same limitations and exclusions. If a material defect is incapable of correction, or if D-Link determines that it is not practical to repair or replace the defective Hardware, the actual price paid by the original purchaser for the defective Hardware will be refunded by D-Link upon return to D-Link of the defective Hardware. All Hardware or part thereof that is replaced by D-Link, or for which the purchase price is refunded, shall become the property of D-Link upon replacement or refund.

Limited Software Warranty:
D-Link warrants that the software portion of the product ("Software") will substantially conform to D-Link's then current functional specifications for the Software, as set forth in the applicable documentation, from the date of original retail purchase of the Software for a period of ninety (90) days ("Software Warranty Period"), provided that the Software is properly installed on approved hardware and operated as contemplated in its documentation. D-Link further warrants that, during the Software Warranty Period, the magnetic media on which D-Link delivers the Software will be free of physical defects. The customer's sole and exclusive remedy and the entire liability of D-Link and its suppliers under this Limited Warranty will be, at D-Link's option, to replace the non-conforming Software (or defective media) with software that substantially conforms to D-Link's functional specifications for the Software or to refund the portion of the actual purchase price paid that is attributable to the Software. Except as otherwise agreed by D-Link in writing, the replacement Software is provided only to the original licensee, and is subject to the terms and conditions of the license granted by D-Link for the Software. Replacement Software will be warranted for the remainder of the original Warranty Period and is subject to the same limitations and exclusions. If a material non-conformance is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to replace the non-conforming Software, the price paid by the original licensee for the non-conforming Software will be refunded by D-Link; provided that the non-conforming Software (and all copies thereof) is first returned to D-Link. The license granted respecting any Software for which a refund is given automatically terminates.

Non-Applicability of Warranty:
The Limited Warranty provided hereunder for Hardware and Software portions of D-Link's products will not be applied to and does not cover any refurbished product and any product purchased through the inventory clearance or liquidation sale or other sales in which D-Link, the sellers, or the liquidators expressly disclaim their warranty obligation pertaining to the product and in that case, the product is being sold "As-Is" without any warranty whatsoever including, without limitation, the Limited Warranty as described herein, notwithstanding anything stated herein to the contrary.

Submitting A Claim:
 The customer shall return the product to the original purchase point based on its return policy. In case the return policy period has expired and the product is within warranty, the customer shall submit a claim to D-Link as outlined below:

- The customer must submit with the product as part of the claim a written description of the Hardware defect or Software nonconformance in sufficient detail to allow D-Link to confirm the same, along with proof of purchase of the product (such as a copy of the dated purchase invoice for the product) if the product is not registered.
- The customer must obtain a Case ID Number from D-Link Technical Support (USA 1-877-453-5465 or Canada 1-800-361-5265), who will attempt to assist the customer in resolving any suspected defects with the product. If the product is considered defective, the customer must obtain a Return Material Authorization ("RMA") number by completing the RMA form. Enter the assigned Case ID Number at https://rma.dlink.com/ (USA only) or https://rma.dlink.ca (Canada only).
- After an RMA number is issued, the defective product must be packaged securely in the original or other suitable shipping package to ensure that it will not be damaged in transit, and the RMA number must be prominently marked on the outside of the package. Do not include any manuals or accessories in the shipping package. D-Link will only replace the defective portion of the product and will not ship back any accessories.

- The customer is responsible for all in-bound shipping charges to D-Link. No Cash on Delivery ("COD") is allowed. Products sent COD will either be rejected by D-Link or become the property of D-Link. Products shall be fully insured by the customer and shipped to D-Link Systems, Inc.

- **USA residents** send to 17595 Mt. Herrmann, Fountain Valley, CA 92708. D-Link will not be held responsible for any packages that are lost in transit to D-Link. The repaired or replaced packages will be shipped to the customer via UPS Ground or any common carrier selected by D-Link. Return shipping charges shall be prepaid by D-Link if you use an address in the United States, otherwise we will ship the product to you freight collect. Expedited shipping is available upon request and provided shipping charges are prepaid by the customer. D-Link may reject or return any product that is not packaged and shipped in strict compliance with the foregoing requirements, or for which an RMA number is not visible from the outside of the package. The product owner agrees to pay D-Link's reasonable handling and return shipping charges for any product that is not packaged and shipped in accordance with the foregoing requirements, or that is determined by D-Link not to be defective or non-conforming.

- **Canadian residents** send to D-Link Networks, Inc., 2525 Meadowvale Boulevard Mississauga, Ontario, L5N 5S2 Canada. D-Link will not be held responsible for any packages that are lost in transit to D-Link. The repaired or replaced packages will be shipped to the customer via Purolator Canada or any common carrier selected by D-Link. Return shipping charges shall be prepaid by D-Link if you use an address in Canada, otherwise we will ship the product to you freight collect. Expedited shipping is available upon request and provided shipping charges are prepaid by the customer. D-Link may reject or return any product that is not packaged and shipped in strict compliance with the foregoing requirements, or for which an RMA number is not visible from the outside of the package. The product owner agrees to pay D-Link's reasonable handling and return shipping charges for any product that is not packaged and shipped in accordance with the foregoing requirements, or that is determined by D-Link not to be defective or non-conforming. RMA phone number: 1-800-361-5265 Hours of Operation: Monday-Friday, 9:00AM – 9:00PM EST

What Is Not Covered:
The Limited Warranty provided herein by D-Link does not cover:
Products that, in D-Link's judgment, have been subjected to abuse, accident, alteration, modification, tampering, negligence, misuse, faulty installation, lack of reasonable care, repair or service in any way that is not contemplated in the documentation for the product, or if the model or serial number has been altered, tampered with, defaced or removed; Initial installation, installation and removal of the product for repair, and shipping costs; Operational adjustments covered in the operating manual for the product, and normal maintenance; Damage that occurs in shipment, due to act of God, failures due to power surge, and cosmetic damage; Any hardware, software, firmware or other products or services provided by anyone other than D-Link; and Products that have been purchased from inventory clearance or liquidation sales or other sales in which D-Link, the sellers, or the liquidators expressly disclaim their warranty obligation pertaining to the product.

While necessary maintenance or repairs on your Product can be performed by any company, we recommend that you use only an Authorized D-Link Service Office. Improper or incorrectly performed maintenance or repair voids this Limited Warranty.

Disclaimer of Other Warranties:
EXCEPT FOR THE LIMITED WARRANTY SPECIFIED HEREIN, THE PRODUCT IS PROVIDED "AS-IS" WITHOUT ANY WARRANTY OF ANY KIND WHATSOEVER INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT.

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CE Mark Warning:

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

FCC Statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For detailed warranty information applicable to products purchased outside the United States, please contact the corresponding local D-Link office.

Registration

Register your product at registration.dlink.com
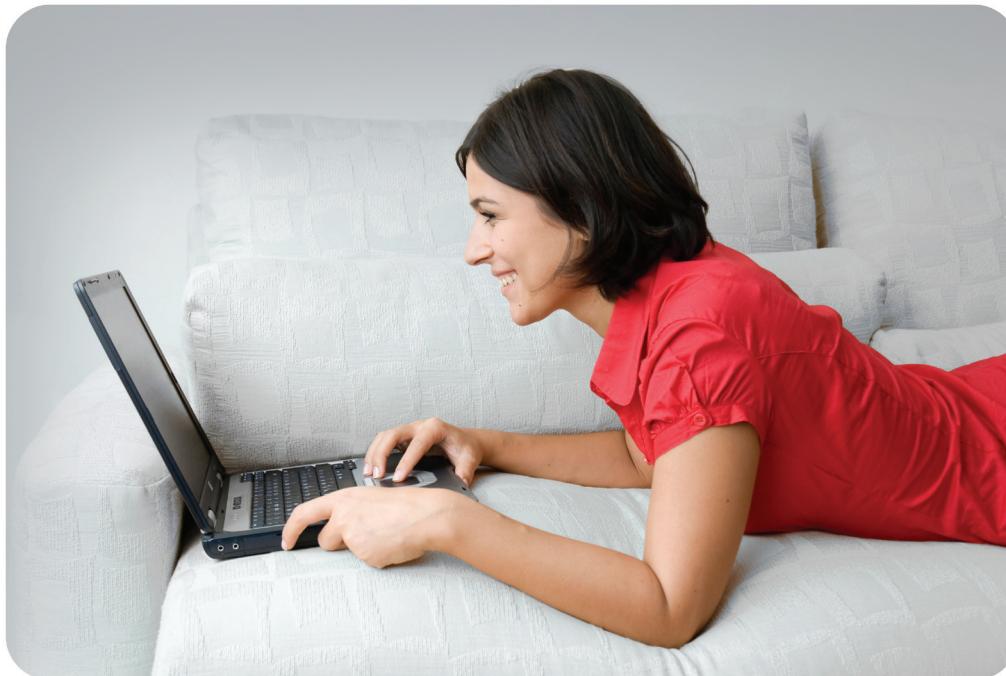
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